Symons's
Meteorological Magazine.

No. 578. MARCH, 1914. Vol. XLIX.

ROYAL METEOROLOGICAL SOCIETY.

The fourth meeting of the Society during the present session was held on February 18th at the Institution of Civil Engineers, Westminster, Mr. C. J. P. Cave, President, in the chair.

Dr. W. N. Shaw, F.R.S., read a paper on the "Interpretation of the Results of Soundings with Pilot-Balloons." The author pointed out that the paper was an extension of two previous communications, one a paper recently published by the Scottish Meteorological Society, and the second a paper communicated to the Royal Society of Edinburgh on December 1st, 1913. He had taken in the present instance several types of atmospheric structure given in Mr. Cave's book, and computed from the results of soundings with pilot-balloons the pressure and temperature differences per 100 kilometres in the north-south line and east-west line at successive kilometre levels. When irregular fluctuations in the wind velocity were found, corresponding irregularities in temperature and pressure differences must be looked for at the successive levels, these irregularities being obvious characteristics of the observations of wind velocity, pressure difference and temperature difference.

The President expressed thanks to Dr. Shaw for his masterly paper, and said it would be interesting to carry this research further, and see if irregularities of wind velocity cause irregularities of temperature, or if the irregularities of temperature were the cause of irregularities in wind velocity.

Mr. Gold, Mr. R. H. Hooker, and Major W. S. Brancker also took part in the discussion, and Dr. Shaw replied.

Mr. G. M. B. Dobson, B.A., F.R.Met.Soc., read a paper on the "Pilot-Balloon Ascents at the Central Flying School, Upavon, during the year 1913." The results taken from 97 ascents in which the balloons reached a greater height than 1000 metres were dealt with. It was found that the direction of the wind veers from, and its velocity increases with, increasing height above the ground, until the gradient direction and velocity are reached. The mean increase, however, is considerably less rapid than would be given if we assume the wind to increase as the height above sea-level. The gradient velocity is usually reached at a height of 300 metres above the surface; though the gradient direction is not found until a height of about 800 metres. At higher altitudes the velocity tends to increase, and the direction continues to veer, slightly beyond the gradient

velocity and direction. The ascents were divided into three groups, according as the wind at 650 metres was light (below 4·5 metres per second), moderate (between 4·5 and 13 metres per second), or strong (above 13 metres per second). The light winds show little increase of velocity with height; and they do not seem to have quite reached the gradient velocity below 1000 metres. The moderate winds attain the gradient velocity at 300 metres, but the strong winds at 500 metres, also the increase of velocity is greater for strong than for moderate winds. If the surface velocity be expressed as a percentage of the upper wind, the value so found decreases with increasing strength of wind. Thus for light winds the surface velocity is 87 per cent. of the wind at 650 metres, for moderate winds 64 per cent., and for strong winds 56 per cent. Light winds also show considerably less change of direction with height than do moderate and strong winds. It was found that the moderate winds went on veering considerably after the gradient direction was reached.

The ascents were divided into four groups according to wind direction, the results being fairly uniform up to 1,300 metres, above which height the north-east winds fell off.

The conditions in the early morning and about the middle of the day were also considered, from which it was shown that in the early morning the increase of velocity with height was much more rapid then than in the middle of the day, the increase being greater in spring than in summer.

Dr. W. N. Shaw complimented the author on showing the results of individual ascents on the same diagram.

Mr. Whipple said that the fact that the N.E. wind fell off as the balloons reached greater heights was a good illustration of a point in Dr. Shaw's paper. He had been much interested in the earlier diagrams showing a large number of cases in which the wind behaved peculiarly at lower altitudes.

Mr. C. J. P. Cave, Mr. J. E. Clarke and Mr. G. S. Taylor also took part in the discussion, and Mr. Dobson replied.

The following new fellows were elected:—Mr. P. Arnold Bernard, Mr. A. F. Sharman Crawford, Rev. Canon A. M. Deane, M.A., F.R.A.S., Mr. W. W. Goudie, Mr. E. H. Hankin, M.A., D.Sc., Mr. G. S. Lowe, F.R.G.S., Capt. Seaton Massy, Capt. G. F. Mead, Sir Ismail Sirry, Pasha, K.C.M.G., and Mr. John Woodrow, Junr.

THE BRITISH RAINFALL ORGANIZATION is arranging an exhibit in the Science Section of the Anglo-American Exposition.

It is wished to compare the instruments employed for measuring rainfall in use 100 years ago, with those of to-day.

Any Observers who have rain gauges of tne 1814 period, or any earlier date, who would care to lend them for the purpose, are requested to communicate with the Director of the British Rainfall Organization at 62, Camden Square, London, N.W

BRITISH METEOROLOGICAL CONFERENCE.

As the British Association meets in Australia this year it has been suggested that it would be desirable to organise a Conference to discuss "The various aspects of the physical sciences in their application to the study of the phenomena of weather." It is proposed upon the invitation of the Scottish Meteorological Society, that the Conference should take place in Edinburgh, on Tuesday, 8th September, 1914, and the four following days.

Sir John Murray, K.C.B., F.R.S., at the unanimous request of the Organising Committee, has consented to act as President of the meeting, while the Vice-Presidents are the Lord Provost of Edinburgh (Mr. R. K. Inches), the President of the Royal Society of Edinburgh, the Director of the Meteorological Office, the President of the Royal Meteorological Society, the President of the Scottish Meteorological Society, the Director of the British Rainfall Organization, and the President of the Royal Aeronautical Society. The proceedings will open with a Presidential address at 10 a.m., on Tuesday, September 8th; the mornings will be devoted to the discussion of scientific subjects connected with the study of the atmosphere. There will be demonstrations during the afternoons, and lectures are to be arranged for two evenings, and a reception for another. Saturday will be filled up by excursions to some places of scientific interest.

The scope of the papers to be discussed will, it is hoped, include the physical and observational aspects of Meteorology, Climatology, including Medico-Climatology, Oceanography, Lymnology, Atmospheric Electricity, Terrestrial Magnetism and Seismology.

The subscription for members of the Conference has been fixed at ten shillings; tickets of admission for ladies accompanying members are to be issued at five shillings. Those interested in the proposal who may wish to become members, are requested to communicate as soon as possible with the Hon. Secretary of the Committee, Mr. F. J. W. Whipple, M.A., at the Meteorological Office, South Kensington, London, S.W.

SCOTTISH METEOROLOGICAL SOCIETY.

A MEETING of the Society was held in the Goold Hall, Edinburgh, on the evening of Monday, 23rd February, 1914, when Mr. Gilbert Thomson, M.Inst.C.E., F.R.S.E., Vice-President, delivered a popular lecture on "Mountain Meteorology."

Professor R. A. Sampson, F.R.S., presided over a large attendance, and made sympathetic reference to the great loss the Society had sustained through the recent death of Dr. R. T. Omond, who had done so much for meteorology and especially for that branch of the Science which was to be considered that evening.

Mr. Thomson in his lecture first of all considered the elementary problem of the origin and progress of winds over a smooth globe,

assuming the distribution of land and water to be known, and then pointed out that when these winds encountered mountain ranges and so had to ascend, questions of great complexity were introduced. The expansion of air as it rose to the higher regions, its cooling as the result of this expansion, and its consequent diminished capacity for water vapour, were at the root of all mountain meteorology. The result was to produce mist and rain even from air which at a lower level was comparatively dry; whilst the Föhn wind of the Alps, which had been noticed sometimes in Scotland, had its origin in the converse condition of air descending and becoming heated by compression. Valley fogs and "temperature inversions" might be traced to the same causes under different conditions. The influence of orographical conditions on the distribution of rainfall was discussed, and it was pointed out that in Scotland even the large rivers flowing eastward owed much of their volume to their headwaters among the western mountains. Among secondary phenomena the glaciers of the Alps were referred to as stores of water and of power, whilst even in Scotland the mountain snowfields had a regulating effect on the rivers. The effect of the sun's rays at high altitudes, the increased evaporation due to diminished pressure, and the height at which rainfall ceased to increase, were discussed, and finally reference was made to the work of high level observatories, with special reference to Ben Nevis.

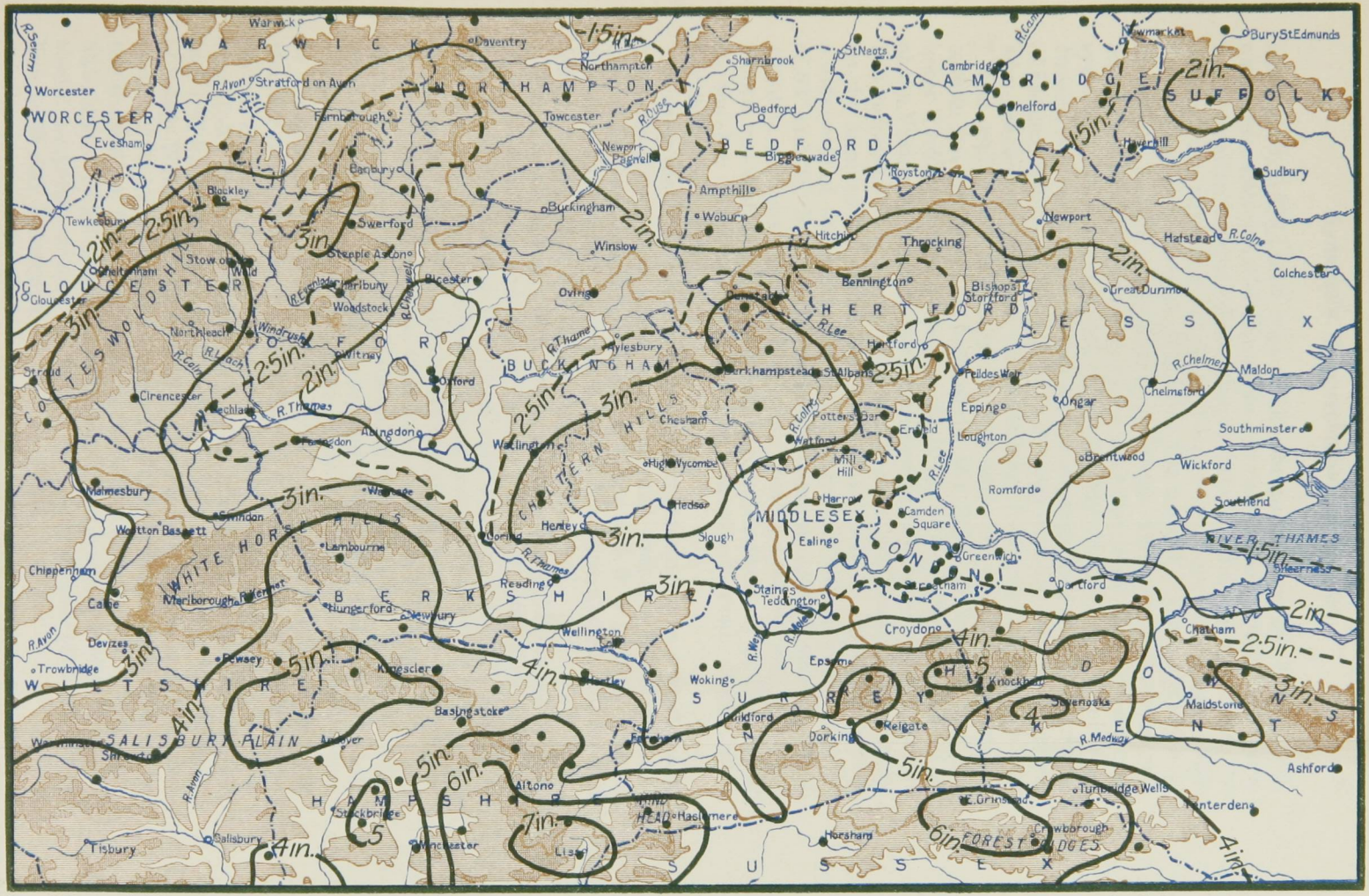
The more technical parts of the lecture were illustrated with useful diagrams, and numerous photographs were shown, many of them from the lecturer's own camera, of weather effects in the Scottish mountains and in the Alps.

The lecture was greatly appreciated, and Mr. Thomson spoke, not only as a student of meteorology, but as an expert mountaineer. A hearty vote of thanks was accorded on the motion of Mr. A. Watt, the Society's Secretary.

THE WEATHER OF FEBRUARY.

THE outstanding feature of the weather of the month was its exceptional mildness, due to the continued prevalence of strong southerly to westerly winds, frequently reaching gale force. From the values given in the *Weekly Weather Report* of the Meteorological Office it was found that the mean temperature of the month, taking the British Islands as a whole, was 4°·0 above the average, the greatest excess being 5°·6 in the east of England, 5°·2 in the north-east of England, and 5°·1 in the Midlands. On the other hand, the departure from the normal did not exceed 2°·6 in Ireland, and in the Channel Islands was only 2°·4. At Camden Square the mean temperature was 44°·5, or 4° 8 above the 56 years' average, the month being the mildest February since 1903, when the mean temperature was 45°·1. The only warmer Februaries back to 1858

THAMES VALLEY RAINFALL — FEBRUARY, 1914.



Symons's Meteorological Magazine.

Watershed of River Thames above Teddington, and River Lee above Feildes Weir.

Rainfall Stations reporting .....

Isohyetals.

were 1903, 1872, 1869 and 1867, the mildest of all being 1869, when the mean was 5°·9 above the normal. The warmth last month was somewhat unequally partitioned between the day and night, the mean of the maximum readings being 5°·6 above the normal, while the minimum values were 3°·8 above the normal. During practically the whole month anticyclonic conditions were absent, our islands being under the influence of a constant succession of cyclonic systems passing in a general north-easterly direction to the west of Ireland, and with their centres on the average located over the south of Iceland, but occasionally passing directly over the United Kingdom. The barometric pressure for February, from the average of the 7 a.m. and 6 p.m. readings, showed that the mean value for the month was 29·32 in. at Isafjord in the N.W. of Iceland and was lower further south, falling to 29·15 in. at Reykjavik and 29·10 in. at the Vestmann Islands. At Thorshavn in the Faröe Islands pressure had increased to 29·16 in., and at Horta in the Azores the mercury on the mean of the month was as high as 30·12 in., there being thus a difference of more than an inch of mercury between the latitudes of 63° and 38° N. To the far north pressure again increased, being 29·60 in. at Spitzbergen. The most notable cyclonic system of the month was that of the 22nd when barometric pressure at Dublin fell to the low level of 28·05 in., the lowest observed there since December 8th, 1886.

During the first half of the month temperature was exceptionally high, being over 7° in excess of the normal over the north-east and east of England and the Midland counties, and 5°·6 over the United Kingdom as a whole. Frost was virtually absent, and in the Channel Islands temperature did not fall below 40°.

The month opened with strong southerly winds of gale force, high temperatures, and heavy rain in the north and west. On the 1st, Fort William had 2·69 in. of rain and Bendamph 2·36 in. On the 2nd, some high shade maximum temperatures were noted, the thermometer rising to 60° at Hawarden Bridge, while even in the north of Scotland, Gordon Castle recorded 58° and Nairn 57°. On the 3rd, at Shrewsbury a maximum of 61° was noted, Rhyl reporting a reading of 59°. The lowest readings observed during the first half of the month were 28° at Balmoral on the 3rd, and a similar value at Llangammarch Wells on the 9th. From the 10th to the 14th thunder and lightning, or lightning only, occurred in many localities, and on each day during this period heavy rains were frequent. On the 10th, Treherbert reported 2·07 in., on the 12th, Blaenau-Hydfer had 1·87 in., the maximum fall on the 13th occurred in the uplands of South Wales, Llyn Fawr 2·88 in., Treherbert 2·43 in., and Blaenau-Hydfer 2·00 in., the latter station on the 14th reporting 2·32 in. In the three days from the 12th to the 14th there fell 6·47 in. at Llyn Fawr and 6·19 in. at Blaenau-Hydfer. At London on the 14th the shade temperature rose to 58° or 59°, and on the 15th to 59° at Lowestoft and Yarmouth.

During the second half of the month, speaking broadly, the general distribution of pressure did not differ materially from that observed in the first half, temperature, however, although considerably in excess of the normal was, at times, rather low in Scotland. On the 19th and 20th the shade thermometer fell to 19° at Balmoral, and on the former date to 23° at Fort Augustus.

On the 21st, thunder was heard at Macclesfield and Waterford, and thunderstorms occurred at Holyhead and Roche's Point. On the 22nd, a large and unusually deep cyclonic disturbance advanced from the Atlantic, which caused gales from various quarters in most places, its arrival was preceded on the 20th and 21st by gales from the south, and south-east on many parts of our coasts.

On the 25th the temperature at West Linton fell to 22°, and at Newton Rigg to 24°, a reading of 22° being again recorded at the former station on the 26th. During the second half of the month there were few heavy daily rainfalls recorded. At Seathwaite 2·23 in. fell on the 17th, and 2·11 in. on the 22nd. No other station reported a fall of 2 inches in the 24 hours, but on the 17th Foffany Reservoir had 1·80 in., Dungeon Ghyll on the 20th, 1·67 in., and Dunmanway on the 21st, 1·61 in. The month closed as it began with high temperatures, the shade maximum on the 28th rising to 58° at Rhyl, and to 56° at Nairn and Leith.

The general rainfall of the month expressed as a percentage of the average was: England and Wales, 136; Scotland, 145; Ireland, 202; British Isles, 157.

REVIEWS.

The Ocean, by Sir John Murray, K.C.B., F.R.S. London: Williams and Norgate. Size 7 × 4, pp. 256 and plates. Price 1s.

This fascinating book by the leading authority on the science of the sea, is a recent addition to the Science Series of the Home University Library, and one which we can cordially commend to our readers. In it we have in a necessarily highly condensed but admirably balanced form a lucid account of oceanography, largely derived from the practical experience of one whose whole life has been associated with the development and practical application of this science to the varied interests of humanity. The work opens with a few historical statements, followed by a description of instrumental and other methods involved in deep sea research. Chapter II. deals with the depth of the ocean, and it is shown that by far the greatest areas are covered by water of from 2000 to 3000 fathoms, the whole Atlantic Ocean having 48 per cent. of water of this depth, the Indian Ocean 59 per cent, and the Pacific Ocean 65 per cent., while the whole ocean averages 58 per cent. The greatest proportion of shallow water (less than 1000 fathoms) is found in the Atlantic, while the Pacific and Indian Oceans have 10 and 11 per cent.

respectively. The volume of dry land above sea level is shown to be 23,000,000 of cubic miles, while the volume of the waters of the ocean is estimated at 324,000,000 of cubic miles. In subsequent chapters Sir John deals with the salinity, gases, temperature, tides and waves of the ocean, its circulation, plant and animal life. The concluding pages summarise the leading features referring to the floor of the ocean, and the results of the analysis of thousands of samples of deep sea and shallow water deposits. The final chapter is devoted to the geospheres, the globe being regarded as made up of six concentric spheres, the atmosphere, hydrosphere, biosphere, lithosphere, tektosphere, and the centrosphere. A glossary of technical words and expressions is given, and an excellent feature is the series of twelve plates appended, although here one misses a map showing the mean surface temperature of the ocean. The book, while primarily adapted to the needs of the lay reader, is one which will repay perusal by meteorologists, physicists and biologists who wish to make themselves familiar with the rapid advance in the new science of oceanography initiated by the great expedition of the *Challenger* forty years ago.

Rainfall Reservoirs and Water Supply, by Sir A. R. Binnie. London: Constable and Company, Ltd. 1913. Size 9 × 6. Pp. xi.+157. Price 8s. 6d. nett.

Sir Alexander Binnie in this interesting and welcome volume illustrates some of the salient points associated with the practical application of rainfall observations to the affairs of daily life, showing how meteorological, geological and chemical data are essential to the sanitary Engineer. As the author points out in the preface the work is not a complete treatise on Waterworks Engineering, but an attempt to elucidate some of the utilitarian aspects of one of the most difficult points met with by the Engineer.

The first chapter deals with the measurement of rainfall, the effect of the geographical position of a station with reference to the nature and direction of prevailing winds is discussed, and it is shown that the lee side of a mountainous region frequently experiences the maximum rainfall, and diagrams are also given to illustrate how the precipitation increases as the land rises. The question of the proportion of rain that may fall in the wettest and driest years, the three wettest and driest years, and in other periods of years above or below the normal is shown by means of tables and diagrams. Other chapters deal with the flow from the ground, including flood intensity and evaporation, water supply *per capita*, qualities of water, hardness —impurities—filtration. Chapter IV. deals with the sources of supply, drainage areas, and deductions for stream compensation. Fully two-thirds of the work deals with purely engineering aspects such as the construction of reservoirs, dams, culverts, tunnel outlets and aqueducts, all treated in detail in a most interesting manner and copiously illustrated.

Ingatestone and the Essex Great Road, by E. E. WILDE. H. Milford, London, 1913. Size 9 × 6. Pp. 488, 5 maps and 1 plate.

WE do not, as a rule, open our review pages to books of a non-meteorological character, unless, as it sometimes happens, accounts of atmospheric phenomena, made peculiarly valuable from the evidence of eye-witnesses, find a place in them which they do not find elsewhere. We have read Mrs. Wilde's scholarly book with exceptional interest, especially the account of the notable hailstorm and squall which swept over Ingatestone on June 24th, 1897, described on pages 341-344. This supplements the account which appeared in this Magazine (Vol. **32**, 1897, p. 81). A map showing the course of the storm, specially drawn by Mr. D. S. Salter, of the British Rainfall Organization, adds greatly to the utility of Mrs. Wilde's history of the phenomenon. The book also contains a brief note on the rainfall of the district, which is one of the driest in the British Isles. C.S.

INTERNATIONAL BALLOON ASCENTS.

By W. H. DINES, F.R.S.

April 6th, 1911.

Starting Point.	Country.	A (H_c)	B (T_c)	C	D	E	F
		miles.	° F.	miles.	° F.	miles.	
Pyrton Hill*	England ..	6·2	—63	8·7	—64	75	S.W. byW
Pyrton Hill.....	England ..	6·1	—58	9·4	—59	60	W.S.W.
Brussels	Belgium ..	5·3	—63	9·4?	?	71	W.
Hamburg	Germany..	6·4	—64	12·6	—59	36	W.S.W.
Lindenbreg	„ ..	5·6	—67	9·5	—62	4	W. by N.
Paris	France ...	4·9	—50	10·7	—63	50	W. by S.
Strassburg.....	Germany..	5·3	—63	9·2	—49	33	W. by N.
Munich	„ ..	5·4	—67	6·7	—53	21	N.W.
Vienna.....	Austria ..	5·6	—62	6·6	—54	20	N.N.W.
Pavia	Italy	5·8	—59	10·4	—50	28	N.N.E.
Pavlovsk	Russia	5·6	—68	9·7	—64	58	E.
Nishni Olchedaeff	„ ..	6·3	—75	9·1	—53	23	N.E.

* 6 p.m., April 5th.

A Height in miles of commencement of isothermal column.
B Temperature, F°., at bottom of column.
C Greatest height of reliable record in miles.
D Temperature, F°., at greatest height.
E Distance in miles of point where balloon fell.
F Bearing of falling point from starting point.

The value of H_c was low throughout, and, with the exception of Paris, very uniform. The surface temperature in the S.E. of England was exceptionally low for the date, and a temperature of — 20° F. at a height of 10,000 ft. over Pyrton Hill, on April 5th, is the lowest yet recorded at that height in England.

An anticyclone lay over the north of Scandinavia extending westwards towards Iceland, and there were various depressions over the Mediterranean.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

BISHOP'S RING.

WHILE at Kandersteg, Canton Berne, recently this interesting appearance was twice clearly seen, namely, on Friday and Monday, January 16th and 19th, in each case from an Alp at 5000 to 5500 ft. elevation, and to less advantage on the 16th from Kandersteg itself, at 4000 ft. It could not be distinguished when the sun was in sight, but directly that was behind a peak the orange-tawny ring round a markedly greenish circle of 15° to 20° radius became sufficiently marked for others of the party to be interested when their attention was called to it. The ring itself stretched over another 15° or so, as roughly measured by the eye.

As yet I have not been able to make, nor have I heard of, an observation of it in England, but its re-appearance, following the striking series of Krakatoa-like sunsets last year, at intervals from early June to mid-December (I have 59 sunrise and sunset records in all), is significant, as pointing to an association of both phenomena with the Aleutian eruption in May, 1912.

J. EDMUND CLARK.

Asgarth, Riddlesdown Road, Purley, Surrey, February 4th, 1914.

WEATHER AT PEMBA, ZANZIBAR.

THE following summary of Meteorological observations taken at this station during the year 1913, and also for the past fifteen years, may be of interest.

	For the year 1913.	For the past 15 years.
Mean maximum temperature	81·4	81·9
Mean minimum temperature	69·8	70·5
Absolute maximum temperature	90·0	95·0
Absolute minimum temperature	65·0	62·0
Extreme range	25·0	33·0
Rainfall in inches	86·89	82·96
Rainy days	177·0	156·5

Sun temperature in January reaches 175·0.
Sun temperature in July reaches 150·0 only.

THEODORE BURTT.

Friends' Industrial Mission, Banani, Pemba, Zanzibar, 10th January, 1914.

GLAZED FROST.

THE question whether raindrops were super-cooled upon any special occasion could easily be settled by allowing the drops to fall upon a surface kept exactly at the freezing point. If the drops were super-cooled ice would appear when they struck, if not, since the water would be in close contact with a surface not below the freezing point no ice would form. Such a surface could be obtained by using a thin metal vessel filled with a mixture of broken ice and water. It would have to be kept well shaken, and not much handled so that the water inside and the metal might be exactly at 32° F. It is true that a slight rise of temperature would occur as the drop struck, just as a bullet gets hot on striking a target, but as the falling velocity is small this could hardly amount to ·01°.

W. H. DINES.

A LOCAL COLD AREA.

A VERY striking example of the remarkable differences of temperature which are sometimes observed during foggy weather in the Metropolitan, or similarly more or less restricted areas, occurred here on February 27th

As in most other parts of London, the early morning was very foggy, the minimum shade temperature during the preceding night having been 27°, whilst the 9 a.m. reading was 31°. In contradistinction to other districts the fog did not clear off between 11 a.m. and noon but remained very thick until 1 p.m., after which it cleared considerably, but the air remained very misty and the sunshine extremely feeble. At noon the temperature was still only 32° and at 1.30 p.m., 35°. During the afternoon there was a recovery to the maximum of 39·2°, which occurred at 4 p.m., after which it again fell to 36° at 6 p.m. (as against 47° to 51° at the other London recording stations), to 30° at 10 p.m., and to a minimum of 24° during the ensuing night, when the reading on the grass was as low as 18°.

In other parts of the Metropolis the fog appears to have cleared off at the latest at about 11.30 a.m., after which the weather was brilliantly sunny and very mild. In many parts of London from four to nine hours of bright sunshine were registered and the maximum temperature was apparently in all cases over 50°, that registered in St. James' Park being as high as 55°, or 16° higher than that recorded here.

You may think this remarkable record of sufficient importance for inclusion in your columns, being specially notable in view of the lateness of the season and the consequent increasing power of the sun to disperse fog.

I may add that there was practically no wind during the whole of the day, with the exception of occasional light airs from the south and also north-east.

HAROLD FREIR.

Bylock Hall, Ponders End, N., 2nd March, 1914.

THE STEVENSON SCREEN.

I AM very glad to see from Mr. Butler's letter in your Magazine for February, that the Stevenson Screens in the south now have double tops and closed bottoms, as it is now nearly 30 years since I pointed out (*Pro. Roy. Soc. Edin.*) the necessity for these protections. At that time I was told that such additions to the screen were objectionable as the readings given by them could not very well be compared with the previous results. But while these additions have been adopted by the makers of the screens in the south, this is not the case with the makers of the screen for the Scottish Meteorological Society from whom I have received a number of screens, the last one only two or three years ago, all the screens were exactly alike but not one of them had either double top or any protection at bottom.

The want of uniformity in the temperature of the air during sunshine, referred to by Mr. Ellison in your last number, is well known. In one of the papers previously referred to there is described a thermometer with a long fine cylindrical bulb only 1·5 mm. diameter. When this thermometer is put under a sunshade while the sun shines the unequal heating of the "shreds and patches" of the passing air is shown by the constant up and down movement of the mercury. It is kept in a constant state of pulsation, moving up and down a degree in less than a minute, and of course the differences shown are not the whole differences in the different shreds of air. But while the air is a mixture of shreds and patches at different temperatures, I fear Mr. Ellison will get few to agree with him in thinking that because we cannot get perfection there is no use of attempting to get a nearness to it. All our measurements of the velocity of rivers, winds and many other things are of the same nature, and yet we go on trying to get as near the truth as possible.

Though the whole mass of air is a mixture of more or less heated patches, yet there is a true temperature to be attained by mixing the lot, and a thermometer when placed in a screen does this fairly well. The very fine bulbed thermometer shows the inequalities in the temperatures of the different patches, while the screen helps to mix the different airs, and to cool the hot parts and warm the cold ones as they pass over the louvres; while the larger bulbed thermometers give a fair mean of the mixture. But the screen must always read higher than the true temperature of the air while the sun shines, especially if the wind is light and from the heated side of the screen, as the sun-heated louvres heat the air entering the screen. Its readings in sunshine are, therefore, always higher than those given by a thermometer placed in a properly protected enclosure through which a current of air is artificially kept flowing. I may also say that the screen gives higher readings than the very fine bulbed thermometer placed in the open, but under a sunshade. This is especially the case when the bulb is coated with polished silver, and it then gives readings similar to thermometer in artificial current of air.

Both of your correspondents object to the use of the artificial air current for getting the true temperature of the air, but neither give reasons for objecting, or suggest any other standard with which to compare the screens. It was used in the tests referred to because it was considered to be the most accurate method of getting the true temperature of the air, and was, and so far as I know still is, used for this purpose on the continent. JOHN AITKEN.

Ardenlea, Falkirk, 23rd February, 1914.

A PLEA FOR A WORLD'S BUREAU OF METEOROLOGY.

LATE frosts, or wide-spread droughts, in Eurasia, North America, South America or Australia, may mean the loss of millions of pounds in the value of the world's food products,* and this is the prime factor in determining human welfare in every activity of life.

Variations of rainfall precede to some extent the variations in crop production, and these in turn precede the variations in business activity and in the values of securities.

The closeness of these relations have been known to the shrewdest business men for years, and agents are now maintained in all the crop bearing parts of the world to report to private interests the occurrence of late or early frosts, of droughts and all other conditions which may influence crops. Even the information thus furnished is inadequate, and falls far below what might be obtained by an organized bureau.

There is at Rome a World Bureau for Agriculture. There should, in like manner, be a Bureau for World Meteorology. The object of such a bureau would be to gather by telegraph or cable information from all the national bureaus of the world, and from the oceans so far as possible. Chart and correlate the assembled data, and furnish such information to the national bureaus as would be of service to each. With such a World Weather Bureau organized it would not be many years before seasonal forecasts could be begun, and, with such a service in successful operation, the interests of the world would be advanced in a way hardly yet conceived of. There is scarcely a phase of human activity not affected in some way by the weather. The clothier lays in overcoats, furs, fans, etc., to meet the conditions of the ordinary season. The coal dealer, the ice dealer, the shoe dealer, the dealer in rubber goods, etc., do the same thing, and if there is a marked variation from the ordinary season there are heavy losses either to the dealer or to the community, and the total waste of human effort is enormous. H. HELM CLAYTON.

Oficina Meteorológica Argentina, Buenos Aires, January 30th, 1914.

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* A severe drought may cause a loss of $100,000,000 in the United States alone.

ORIGIN OF THE SNOWDON GAUGE.

My attention has been called to letters in recent numbers of your Magazine on the origin of the Snowdon Rain Gauge. The chief feature of the Snowdon gauge is that it possesses a deep rim which avoids splashing of the rain over the edge of the funnel.

The suggestion and use of such a rim, and therefore the origin of the Snowdon gauge, dates back far beyond the years mentioned by either Colonel Ward, Mr. Gilbert, or Mr. Scott. I believe the earliest recorded gauge of this type was that of the celebrated Dr. John Dalton, F.R.S., who, writing from Kendal in 1788, in a letter to one of his Eaglesfield pupils with a request that a gauge should be kept at Eaglesfield gives full direction for the construction of the gauge, mentioning that "the funnel may be 6, 7, or more inches over, and *if it have an upright rim of an inch it is better*, but will do without it." A few years later, however, he decided *it would not do without it*, and certainly during several years before the year 1831 (eighty-three years ago) Dr. Dalton used a gauge having a funnel 10 inches in diameter *with a 5 inch upright rim.* The gauge is described in detail by my father (the late Mr. Henry Hough Watson, F.C.S., who was a pupil of Dr. Dalton) in *Symons's British Rainfall of 1869*, and his observations of rainfall and evaporation with this gauge for the ten years from 1831 to 1840, at Bolton, were published by Dr. Dalton in the *Manchester Philosophical Society's Memoirs* at that time, Vol. **6.** My father continued to use this form of gauge until the year of his death, 1886, and since then I have continued to use one of exactly the same pattern.

Dr. Dalton would appear to have been the originator of the idea of the deep rim and therefore of the modern or "Snowdon Gauge," in which there has been no practical change.

WILLIAM HENRY WATSON, F.G.S., F.C.S.

Braystones House, Cumberland, February 23rd, 1914.

LARGE SNOWFLAKES.

On Saturday, the 21st February, about 10.40 a.m. or so, a shower of rain and hail came up from the south-west: rather later in the morning the rain turned to snow which lasted for nearly an hour. Some of the snowflakes were of enormous size and must have measured three inches: they looked as if they would fit into the mouth of an ordinary sized tea cup. The size was so remarkable that everybody noticed it. Unfortunately in some ways, they melted too quickly for any measurement to be taken, but one made a guess at it by observing their size with relation to leaves, &c., on which they fell.

E. ASTON.

Stonehurst, Five Ashes, Tunbridge Wells, February 26th.

DETONATING FIREBALL ON JANUARY 19th.

THE "peal of distant thunder" heard by Colonel Chrystie about five minutes later than, and in the same direction as, the brilliant meteor he saw on January 19th, was undoubtedly connected with that object. I have received about twenty descriptions of the meteor from the counties of Berks, Oxon, Hants, and Surrey, and they nearly all refer to the loud detonation which followed its brilliant outburst of light. A large number of accounts have also been published in the newspapers.

The sky was not at all favourable. At many places only a few stars could be discerned, at others the firmament was quite veiled, but the astonishingly intense lustre of the meteor broke through the obscurity and just for a moment or two made the country almost as light as day.

The prevailing conditions rendered exact observations of the meteor's path impossible. From careful comparisons of the positions given I conclude that the path of the object was from a point N.W. of Luton, Beds, to Brightwaltham, Berks, and during its flight of about 67 miles it descended from a height of 51 to 11 miles, at a velocity of 14 miles per second. The radiant point was probably at 130° + 47°, which is just S. of the forepaws of the "Great Bear."

If the final disruption and loud explosion occurred over Brightwaltham, as many of the observations suggest, then Colonel Chrystie, at Farnham, was about 36 miles distant from it. Sound, in ordinary air, would traverse this in about three minutes, but in the rarified regions of our atmosphere sound is a slower traveller, and the meteor's height may possibly have been somewhat greater than that assigned. It was certainly, however, near the earth at the instant of its disintegration, and I should not have been surprised to hear that some of the fragments had been seen falling to the ground. Many meteoric stones alighting in thinly populated districts must, however, escape record.

W. F. DENNING.

Bristol, February 18th, 1914.

THE CLIMATE OF TORQUAY.

APROPOS of the recent discussion on the climate of Torquay I write to say that, having had occasion to visit relatives at Paignton recently, I made a careful study of the topography of the district, with the result that I can confirm Mr. Macdowall's contention that there is, and must be, a great diversity in the local climatic conditions. The high ground at the back of the town is fully exposed to every wind that blows—to the rough gales from the sea as well as to the cold land winds blowing down from Dartmoor. The bottom of the town, on the other hand, sheltered from northerly and westerly winds and getting the full benefit of any sunshine that

is "going," has locally an almost southern character, and permits a species of *viola* in the Rock Gardens to bloom fairly freely in the depth of winter. Likewise the higher lying hollow containing Kent's Cavern is so favourably situated with respect both to the sun and to shelter from wind that garden produce is relatively forward therein. The higher parts of Torquay are liable to experience very bleak westerly winds when, as is not seldom, snow in any quantity is lying on Dartmoor. In this connection it was remarked to me during a visit to Exeter, on December 30th, that the presence of much snow on Dartmoor was keeping the weather unusually bitter in the city, although there was not much snow lying in the streets or in the Exe valley.

The abundance of myrtles, fuschias, yuccas, etc., in Torquay gardens often gives rise to exaggerated notions as to the freedom from frost of the south coast of Devon. The correct interpretation of the facts is otherwise, that these exotics *can* stand occasional severe frost. Although this coast is much sunnier, and has a mean winter temperature some 3 degrees higher than the neighbourhood of London, the general climate of England is much the same everywhere, and a spell of hard weather over the country generally is apt to be no respecter of places, as invalids often find to their cost.

L. C. W. BONACINA.

Hampstead, N. W., February 3rd, 1914.

THE WINTER SEASON.

IT may be worth noting that these last two winters at Greenwich (ending in 1913 and 1914) conform to past experience, since 1841, in this respect: The winters of years ending in 3 and 4 (*i.e. ending* in those years) have all been mild except one (1854), which had but a small excess of frost days in September to May (+4).

A "rule of thumb," being merely empirical, and "suggested by practical rather than scientific knowledge" (as a Dictionary says) may inspire no great confidence. Yet it may have its uses.

A.B.M.

CLIMATOLOGY IN RELATION TO AGRICULTURE forms the subject of a course of Lectures now being given by Mr. W. E. Whitehouse, F.R.Met.Soc, of the University College of Wales, Aberystwyth. During his tenure of the Gilchrist Studentship in Geography, Mr. Whitehouse worked specially at Climatology both at the Meteorological Office and at the Office of the British Rainfall Organization. He gave last term a course of lectures on Climatology in relation to Geography.

It is satisfactory to know that Dr. Shaw's repeated appeals for the encouragement of the further study of Meteorology at the Universities is being responded to, as in the present instance.

RAINFALL TABLE FOR FEBRUARY, 1914.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea.	RAINFALL OF MONTH.	
					Aver. 1875—1909.	1914.
		° ′	° ′	ft.	in.	in.
Camden Square	*London*	51 32	0 8	111	1·66	2·37
Tenterden	*Kent*	51 4	*0 41	190	1·90	3·74
Arundel (Patching)	*Sussex*	50 51	0 27	130	2·17	4·16
Fawley (Cadland)	*Hampshire*	50 50	1 22	52	2·28	4·26
Oxford (Magdalen College)	*Oxfordshire*	51 45	1 15	186	1·62	1·65
Wellingborough (Croyland Abbey)	*Northampton*	52 18	0 41	174	1·69	1·18
Shoeburyness	*Essex*	51 31	*0 48	13	1·19	1·09
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	1·59	1·93
Geldeston [Beccles]	*Norfolk*	52 27	*1 31	38	1·41	1·39
Polapit Tamar [Launceston]	*Devon*	50 40	4 22	315	2·95	5·08
Rousdon [Lyme Regis]	,,	50 41	3 0	516	2·50	3·86
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	2·12	2·92
Church Stretton (Wolstaston)	*Shropshire*	52 35	2 48	800	2·17	2·83
Coventry (Kingswood)	*Warwickshire*	52 24	1 30	340	2·01	1·46
Boston	*Lincolnshire*	52 58	0 1	11	1·53	·83
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	1·64	·96
Macclesfield	*Cheshire*	53 15	2 7	501	2·30	2·15
Southport (Hesketh Park)	*Lancashire*	53 39	2 59	38	2·07	2·01
Arncliffe Vicarage	*Yorkshire, W.R.*	54 8	2 6	732	4·88	6·94
Wetherby (Ribston Hall)	,, ,,	53 59	1 24	130	1·71	1·53
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	1·78	·75
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	1·63	1·20
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	10·96	21·14
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	3·07	3·81
Haverfordwest	*Pembroke*	51 48	4 58	90	3·42	5·21
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	3·09	4·86
Llandudno	*Carnarvon*	53 20	3 50	72	2·11	2·62
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	3·42	7·45
Marchmont House	*Berwick*	55 44	2 24	498	2·15	2·00
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	3·87	7·01
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	2·70	3·73
Inveraray (Newtown)	*Argyll*	56 14	5 4	17	5·71	8·94
Mull (Quinish)	,,	56 34	6 13	35	4·45	7·83
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	1·91	2·43
Braemar	*Aberdeen*	57 0	3 24	1114	2·55	4·22
Aberdeen (Cranford)	,,	57 8	2 7	120	2·36	2·45
Cawdor	*Nairn*	57 31	3 57	250	2·06	1·16
Fort Augustus (S. Benedict's)	*E. Inverness*	57 9	4 41	68	4·20	4·12
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	7·53	13·03
Dunrobin Castle	*Sutherland*	57 59	3 56	14	2·58	2·10
Wick	*Caithness*	58 26	3 6	77	2·23	2·60
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	4·99	10·81
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	3·18	5·47
Nenagh (Castle Lough)	*Tipperary*	52 54	8 24	120	2·89	6·57
Ennistymon House	*Clare*	52 57	9 18	37	3·44	8·23
Gorey (Courtown House)	*Wexford*	52 40	6 13	80	2·75	5·24
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	2·55	4·73
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	1·93	2·48
Mullingar (Belvedere)	*Westmeath*	53 29	7 22	367	2·67	4·81
Crossmolina (Enniscoe)	*Mayo*	54 4	9 16	74	4·20	9·00
Cong (The Glebe)	,,	53 33	9 16	112	3·72	9·21
Collooney (Markree Obsy.)	*Sligo*	54 11	8 27	127	3·20	6·84
Seaforde	*Down*	54 19	5 50	180	2·81	3·90
Bushmills (Dundarave)	*Antrim*	55 12	6 30	162	2·56	5·13
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	2·68	5·43

Erratum.—Nenagh (Castle Lough)..... For January *read*... 3·88 2·86

RAINFALL TABLE FOR FEBRUARY, 1914—*continued.*

RAINFALL OF MONTH (*con.*)					RAINFALL FROM JAN. 1.					
Diff. from Av. in.	% of Av.	Max. in 24 hours. in.	Max. in 24 hours. Date.	No. of Days	Aver. 1875—1909. in.	1914. in.	Diff. from Aver. in.	% of Av.	Mean Annual 1875-1909. in.	STATION.
+ ·71	143	·47	21	14	3·49	2·92	— ·57	84	25·11	Camden Square
+1·84	197	·95	21	20	4·04	4·45	+ ·41	110	27·64	Tenterden
+1·99	192	·60	17	16	4·76	4·72	— ·04	99	30·48	Patching
+1·98	187	·60	21	22	5·03	4·94	— ·09	98	31·87	Cadland
+ ·03	102	·32	21	16	3·40	2·14	—1·26	63	24·58	Oxford
— ·51	70	·27	17	16	3·58	2·02	—1·56	56	25·17	Croyland Abbey
— ·10	92	·42	21	16	2·52	1·72	— ·80	68	19·28	Shoeburyness
+ ·34	121	·44	11	13	3·29	3·90	+ ·61	119	25·40	Westley
— ·02	99	·51	21	14	2·94	3·16	+ ·22	107	23·73	Geldeston
+2·13	172	·90	12	20	6·54	6·75	+ ·21	103	38·27	Polapit Tamar
+1·36	154	·60	7	19	5·44	4·70	— ·74	86	33·54	Rousdon
+ ·80	138	·51	21	17	4·45	3·68	— ·77	83	29·81	Stroud
+ ·66	130	·57	12	17	4·68	3·84	— ·84	82	32·41	Wolstaston
— ·55	73	·19	13	13	4·23	2·34	—1·89	55	28·98	Coventry
— ·70	54	·13	17	17	3·07	2·46	— ·61	80	23·35	Boston
— ·68	59	·37	21	14	3·34	1·94	—1·40	58	24·46	Hodsock Priory
— ·15	93	·45	21	13	4·96	4·51	— ·45	91	34·73	Macclesfield
— ·06	97	·28	17†	15	4·62	3·58	—1·04	77	32·70	Southport
+2·06	142	1·04	14	23	11·14	12·62	+1·48	113	61·49	Arncliffe
— ·18	89	·40	22	10	3·60	2·64	— ·96	73	26·87	Ribston Hall
—1·03	42	·25	21	14	3·48	2·60	— ·88	75	26·42	Hull
— ·43	74	·42	21	19	3·53	3·33	— ·20	94	27·94	Newcastle
+10·18	193	2·23	17	25	24·40	33·27	+8·87	136	129·48	Seathwaite
+ ·74	124	·80	13	23	6·72	5·92	— ·80	88	42·28	Cardiff
+1·79	152	·65	12, 17	21	8·11	7·44	— ·67	92	46·81	Haverfordwest
+1·77	157	·84	12	23	7·00	8·56	+1·56	122	45·46	Gogerddan
+ ·51	124	·47	22	18	4·62	4·71	+ ·09	102	30·36	Llandudno
+4·03	218	·92	17	27	7·52	11·36	+3·84	151	43·47	Cargen
— ·15	93	·38	15	16	4·55	3·96	— ·59	87	33·76	Marchmont
+3·14	181	1·02	18	26	8·65	10·77	+2·12	125	49·77	Girvan
+1·03	138	·45	17	26	6·23	6·93	+ ·70	111	35·97	Glasgow
+3·23	156	·93	5	28	13·05	16·50	+3·45	126	68·67	Inveraray
+3·38	176	·92	7	28	10·00	12·52	+2·52	125	56·57	Quinish
+ ·52	127	·49	22	18	3·92	3·88	— ·04	99	28·64	Dundee
+1·67	165	·70	22	21	5·47	7·10	+1·63	130	34·93	Braemar
+ ·09	104	·57	20	15	4·72	3·96	— ·76	84	32·73	Aberdeen
— ·90	56	·38	5	8	4·34	3·69	— ·65	85	29·33	Cawdor
— ·08	98	·74	5	22	9·78	8·10	—1·68	83	44·53	Fort Augustus
+5·50	173	2·36	1	26	16.95	23·14	+6·19	136	83·93	Bendamph
— ·48	81	·46	20	14	5·33	5·45	+ ·12	102	31·90	Dunrobin Castle
+ ·37	117	·57	20	18	4·71	4·50	— ·21	96	29·88	Wick
+5·82	217	1·22	10	28	10·93	15·99	+5·06	146	54·81	Killarney
+2·29	172	1·10	21	24	6·96	7·55	+ ·59	108	39·57	Waterford
+3·68	227	·96	7	26	6·77	9·43	+2·66	139	39·43	Castle Lough
+4·79	239	·70	17	27	7·74	11·34	+3·60	147	46·52	Ennistymon
+2·49	191	·67	10	25	5·94	6·33	+ ·39	107	34·99	Courtown Ho.
+2·18	186	·80	21	25	5·70	6·28	+ ·58	110	35·92	Abbey Leix
+ ·55	129	·46	21	19	4·07	3·48	— ·59	85	27·68	Dublin
+2·14	180	·72	20	27	5·77	6·37	+ ·60	110	36·15	Mullingar
+4·80	214	1·19	17	28	9·55	12·25	+2·70	128	52·87	Enniscoe
+5·49	248	1·17	5	26	8·51	13·05	+4·54	153	48·90	Cong
+3·64	214	·75	12	27	7·07	9·09	+2·02	129	42·71	Markree
+1·09	139	·71	10	24	6·22	5·48	— ·74	88	38·91	Seaforde
+2·57	201	·76	7	25	5·75	7·02	+1·27	122	37·56	Dundarave
+2·75	202	·62	7	28	6·14	7·95	+1·81	130	39·38	Omagh
—1·02	74	·96	10	16	...	...	...	...		

† And 20, 22.

SUPPLEMENTARY RAINFALL, FEBRUARY, 1914.

Div.	STATION.	Rain inches.	Div.	STATION.	Rain inches.
II.	Warlingham, Redvers Road..	5·27	XI.	Lligwy	4·19
,,	Ramsgate	1·47	,,	Douglas	4·24
,,	Hailsham	4·53	XII.	Stoneykirk, Ardwell House...	4·05
,,	Totland Bay, Aston House...	3·84	,,	Dalry, The Old Garroch.....	8·68
,,	Stockbridge, Ashley..	5·00	,,	Beattock, Kinnelhead	10·30
,,	Grayshott	6·41	,,	Langholm, Drove Road	6·41
III.	Harrow Weald, Hill House...	2·57	XIII.	Meggat Water, Cramilt Lodge	7·03
,,	Caversham, Rectory Road ...	2·57	,,	North Berwick Reservoir.....	1·19
,,	Pitsford, Sedgebrook.....	1·40	,,	Edinburgh, Royal Observaty.	1·74
,,	Woburn, Milton Bryant.....	1·79	XIV.	Maybole, Knockdon Farm ...	4·42
,,	Chatteris, The Priory.....	·97	XV.	Ballachulish House	11·47
IV.	Elsenham, Gaunts End	2·24	,,	Campbeltown, Witchburn ..	7·42
,,	Colchester, Hill Ho., Lexden	1·85	,,	Holy Loch, Ardnadam.....	10·91
,,	Ipswich, Rookwood, Copdock	1·82	,,	Islay, Eallabus	7·37
,,	Blakeney.....	·92	,,	Tiree, Cornaigmore	6·01
,,	Swaffham	1·32	XVI.	Dollar Academy	4·14
V.	Bishops Cannings	2·93	,,	Balquhidder, Stronvar.....	9·00
,,	Wimborne, St. John's Hill ...	5·35	,,	Glenlyon, Meggernie Castle..	10·60
,,	Ashburton, Druid House.. ...	8·67	,,	Blair Atholl	5·48
,,	Cullompton	3·86	,,	Coupar Angus	3·51
,,	Lynmouth, Rock House	5·81	,,	Montrose, Sunnyside Asylum.	2·48
,,	Okehampton, Oaklands.. ...	6·44	XVII.	Alford, Lynturk Manse	2·91
,,	Hartland Abbey.....	4·20	,,	Fyvie Castle	1·92
,,	Probus, Lamellyn.....	4·47	,,	Keith Station	1·63
,,	North Cadbury Rectory.....	3·27	XVIII.	Rothiemurchus	2·00
VI.	Clifton, Pembroke Road.....	3·46	,,	Loch Quoich, Loan	20·85
,,	Ross, The Graig	2·81	,,	Drumnadrochit	3·46
,,	Shifnal, Hatton Grange.....	1·95	,,	Skye, Dunvegan	10·53
,,	Droitwich.....	1·70	,,	Lochmaddy Bayhead	7·67
,,	Blockley, Upton Wold.....	2·42	,,	Glencarron Lodge	7·24
VII.	Market Overton.....	1·57	XIX.	Invershin	1·96
,,	Market Rasen	·74	,,	Melvich	2·52
,,	Bawtry, Hesley Hall	·84	,,	Loch Stack, Ardchullin	6·99
,,	Derby, Midland Railway.....	1·33	XX.	Skibbereen Rectory	7·51
,,	Buxton	2·91	,,	Dunmanway, The Rectory ..	11·03
VIII.	Nantwich, Dorfold Hall	1·51	,,	Glanmire, Lota Lodge, No. 1	6·76
,,	Chatburn, Middlewood	2·62	,,	Mitchelstown Castle.....	7·05
,,	Cartmel, Flookburgh	4·80	,,	Darrynane Abbey.....	11·26
IX.	Langsett Moor, Up. Midhope	3·01	,,	Clonmel, Bruce Villa	6·64
,,	Scarborough, Scalby	1·70	,,	Newmarket-on-Fergus, Fenloe	5·83
,,	Ingleby Greenhow	2·72	XXI.	Laragh, Glendalough	7·30
,,	Mickleton	4·70	,,	Ballycumber, Moorock Lodge	3·61
X.	Bellingham, High Green Manor	4·64	,,	Balbriggan, Ardgillan	2·21
,,	Ilderton, Lilburn Cottage ...	2·53	XXII.	Woodlawn	5·37
,,	Keswick, The Bank.....	9·25	,,	Westport, St. Helens	8·58
XI.	Llanfrechfa Grange	4·97	,,	Dugort, Slievemore Hotel ...	9·94
,,	Treherbert, Tyn-y-waun	13·80	,,	Mohill Rectory	5·41
,,	Carmarthen, The Friary	6·20	XXIII.	Enniskillen, Portora.....	6·02
,,	Castle Malgwyn [Llechryd]...	6·11	,,	Dartrey [Cootehill]	3·94
,,	Crickhowell, Tal-y-maes.....	6·50	,,	Warrenpoint, Manor House ..	3·97
,,	New Radnor, Ednol	4·44	,,	Banbridge, Milltown	2·60
,,	Birmingham WW., Tyrmynydd	8·93	,,	Belfast, Cave Hill Road	3·29
,,	Lake Vyrnwy	5·07	,,	Glenarm Castle..... ...	5 04
,,	Llangyhanfal, Plâs Draw.....	2·50	,,	Londonderry, Creggan Res...	6·62
,,	Dolgelly, Bryntirion.....	5·88	,,	Dunfanaghy, Horn Head ...	7·34
,,	Bettws-y-Coed, Tyn-y-bryn...	6·92	,,	Killybegs	6·53

METEOROLOGICAL NOTES ON FEBRUARY, 1914.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow; F for number of days Frost in Screen; f on Grass.

LONDON, CAMDEN SQUARE.—Generally fine and bright in the early part, but dull in the latter half. The mild conditions of the last few days of January continued into February, the 18 days from January 29th to February 15th all having shade max. above 50°. The mean temp. of the month, 44°·5, was 4°·8 above the average, and with only 4 exceptions the highest for February in the 57 years' record. Duration of sunshine 56·6* hours, and of R 55·9 hours. Evaporation ·24 in. Shade max. 59°·1 on 14th; min. 29°·4 on 27th. F 2, f 11.

TENTERDEN.—Beautifully fine most of the first week and at end of month. R nearly every day from 6th to 22nd. Duration of sunshine 115† hours. Shade max. 54° on 14th; min. 30° on 27th. F 4, f 14.

TOTLAND BAY.—The warmest February in 28 years' record, and, excepting February, 1900, with a R of 5·07 in., the wettest also in that period. Mean temp. 45°·0. Duration of sunshine 89·1* hours. Shade max. 51°·0 on 13th; min. 35°·1 on 25th. F 0, f 4.

PITSFORD.—A pleasant month, with many bright days. R ·59 in. below the average. Mean temp. 41°·6. Shade max. 57°·5 on 15th; min. 25°·6 on 27th. F 8.

IPSWICH, COPDOCK.—Duration of sunshine 105·3* hours, and the most recorded in February in the past 11 years. Mean temp. 43°·5. Up to 21st a persistent series of disturbances with constant R, after which the weather became more settled, and the month ended brilliantly. Shade max. 57°·4 on 14th, ; min. 29°·8 on 24th. F 5, f 11.

POLAPIT TAMAR.—Unusually mild, wet and stormy. Shade max. 54°·6 on 4th; min. 28°·3 on 17th. F 4, f 7.

NORTH CADBURY.—Continuous and abnormal warmth. Only 5 days with shade max. below 50°. Some beautiful sunny weather near beginning and end, but a long spell of wet and violent storms in between. Shade max. 59°·0 on 14th; min. 30°·5 on 17th. F 2, f 13.

HODSOCK PRIORY.—Warmer than any February in the previous 35 years, except 1903. Pressure was very low, and the winds strong. Shade max. 56°·0 on 14th; min. 30°·3 on 9th. F 5, f 14.

SOUTHPORT.—The warmest February in 43 years' record. Mean temp. 45°·0, or 5°·7 above the average. Duration of sunshine 59·9* hours, and of R 47·1 hours. Evaporation ·40 in. Shade max. 56° on 2nd; min. 26° on 25th. F 2, f 11.

HULL.—Remarkably fine and dry throughout. Duration of sunshine 58·4* hours. Shade max. 56° on 1st; min. 33° on 22nd. F 0, f 9.

HAVERFORDWEST.—First week fine, afterwards mild, stormy and wet. Gales on 8 days. Duration of sunshine 58·6* hours. Shade max. 54°·5 on 13th; min. 32°·0 on 21st. F 1.

BETTWS-Y-COED.—Shade max. 58° on 5th; min. 31° on 25th. F 2, f 3.

CARGEN.—Warmest and wettest February for many years. Shade max. 52°·0 on 5th; min. 27°·5 on 25th. F 2.

MARCHMONT.—Duration of sunshine 52·1 hours.

COUPAR ANGUS.—Persistently wet and remarkably mild. Mean temp. 4°·3 above the average. Shade max. 53° on 1st; min. 26° on 19th.

LOCH STACK.—Duration of sunshine 45·3* hours.

CASTLE LOUGH.—The wettest February since record commenced in 1875.

DUBLIN.—An unsettled, mild, showery, and squally month of S. and S.W. winds, which attained gale force on 8th, 11th and 22nd. Mean temp. 46°·0. Bar. reading between 9 and 10 a.m. on 22nd, 28·047 in., was the lowest since 8th December, 1886. Shade max. 58°·0 on 3rd; min. 32°·6 on 24th. F 0, f 2.

CONG.—The largest R in any month for 18 years, except once in October and once in December.

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* Campbell-Stokes. † Jordan.

Climatological Table for the British Empire, September, 1913.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity. 0-100	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°		°	°	inches		
London, Camden Square	78·2	27	43·0	16	68·9	51·3	53·8	88	118·9	41·1	1·75	11	6·5
Malta	93·2	3	67·5	21, 29	81·0	73·8	...	73	155·0	..	·00	0	0·4
Lagos	87·5	26	70·3	13	84·7	73·8	72·8	80	156·2	68·2	5·40	19	7·5
Cape Town	76·8	16	39·5	11	65·0	49·8	50·3	76	...	...	1·96	10	4·9
Natal, Durban ...	76·0	27	50·0	3	68·3	61·5	59·2	76	...	...	1·91	8	6·0
Johannesburg	81·2	25	30·0	4	69·9	46·7	38·5	56	142·8	28·8	·39	3	2·3
Mauritius	78·4	27	59·3	19	76·3	63·1	59·9	73	149·8	52·2	1·42	15	5·7
Bloemfontein	83·8	27	29·8	3	70·5	45·8	36·7	51	...	...	1·25	5	3·9
Calcutta...	93·6	22	76·4	30	89·4	79·1	77·6	83	...	74·5	5·67	11	8·0
Bombay...	88·6	30	75·4	13	85·4	77·0	75·3	83	134·9	71·0	5·75	16	6·2
Madras	102·1	1	73·0	25	95·0	78·2	74·1	75	148·6	72·0	3·01	11	4·9
Colombo, Ceylon ...	88·7	22	70·9	10	86·3	75·0	72·5	77	159·4	66·3	2·82	13	6·3
Hongkong	90·9	9	71·4	21	84·7	76·7	74·0	81	...	...	14·57	18	7·2
Sydney	...	...	...	...	...	...	...	...	...	...	...	...	...
Melbourne	69·9	12	36·6	5	62·3	46·6	44·0	64	126·0	29·7	1·38	18	6·8
Adelaide	77·5	17	42·8	1	64·8	48·0	47·1	70	132·4	33·9	2·67	16	5·7
Perth	86·7	30	38·9	17	67·9	49·2	49·1	70	147·2	33·9	3·11	18	3·6
Coolgardie	86·6	13	39·0	18, 26	73·4	46·9	42·3	46	149·4	31·4	1·33	8	2·2
Hobart, Tasmania ..	65·4	18	32·0	11	58·2	42·3	39·4	63	128·4	25·9	1·92	20	6·3
Wellington	68·6	26	40·6	4	58·7	49·5	46·0	75	130·0	30·0	1·69	10	7·2
Auckland	64·0	6	42·0	10	60·2	49·1	48·0	79	133·0	45·2	1·76	14	6·7
Jamaica, Kingston ..	93·5	21	69·4	12	89·3	73·1	71·8	81	...	...	3·57	11	5·2
Grenada	88·0	10	71·0	22	84·9	75·5	...	79	137·0	...	9·06	21	4·5
Toronto	85·4	2	35·6	14	69·6	49·2	49·0	73	...	...	·97	6	3·4
Fredericton	85·0	3	29·0	28	65·8	43·3	...	77	...	...	2·15	8	4·5
St. John, N.B. ...	70·2	1	36·3	30	60·6	48·5	48·0	76	...	...	2·14	8	4·9
Edmonton, Alberta ...	75·2	12	25·9	23	65·2	39·0	...	69	130·0	21·2	·53	7	5·0
Victoria, B.C.	71·1	20	41·5	30	64·9	48·2	50·0	79	...	...	1·95	8	4·6

Johannesburg.—Bright sunshine 282·9 hours.

Mauritius.—Mean temp. of air 0°·4 below, dew point 0°·1 above, and R ·11 in. below, averages. Mean hourly velocity of wind 11·9 miles, or ·2 below average.

COLOMBO.—Mean temp. of air 80°·7, or 0°·5 below, of dew point 0°·9 below, and R ·68 in. below, averages. Mean velocity of wind 5·8 miles per hour.

HONGKONG.—Mean temp. of air 80°·4. Mean hourly velocity of wind 9·5 miles. Bright sunshine 146·8 hours.

Melbourne.—Mean temp. of air 0°·4 above, and R ·97 in. below, averages.

Adelaide.—Mean temp. of air 0°·6 below, and R ·72 in. above, averages.

Perth.—Temp. of air 0°·6 above average.

Coolgardie.—Temp. of air 1°·8 above, and R ·05 in. above, averages.

Hobart.—Temp. of air 0°·5 below, and R ·22 in. below, averages.

Wellington.—Mean temp. of air 2°·8 above, and R 2·55 in. below, averages. Bright sunshine 176·6 hours. Three grass frosts.

Auckland.—Cool and dry. R a little more than a third of the average